



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/582,268	06/09/2006	Yasufumi Nishii	128375	4818
25944 7590 09/01/2009 OLIFF & BERRIDGE, PLC P.O. BOX 320850 ALEXANDRIA, VA 22320-4850				
EXAMINER				
LIU, MICHAEL				
ART UNIT		PAPER NUMBER		
2851				
MAIL DATE		DELIVERY MODE		
09/01/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/582,268

Applicant(s)

NISHII ET AL.

Examiner

Michael Liu

Art Unit

2851

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 21 May 2009.
2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12 and 14-20 is/are pending in the application.
4a) Of the above claim(s) _____ is/are withdrawn from consideration.
5) ☐ Claim(s) _____ is/are allowed.
6) ☒ Claim(s) 1-12 and 14-20 is/are rejected.
7) ☐ Claim(s) _____ is/are objected to.
8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-8508)
Paper No(s)/Mail Date _____
4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____

DETAILED ACTION

1. Receipt is acknowledged of the Amendment filed on 5/21/09. By this amendment, claims 1, 5, and 14 have been amended. Accordingly, claims 1-12 and 14-20 are pending in the instant application.

Claim Objections

2. Claim 19 is objected to because of the following informalities: "a liquid" already has antecedent basis from claim 1. Appropriate correction is required.

Claim Rejections - 35 USC § 103

3. The claim amendments overcome the rejections under Garcia and Fukami in view of Garcia. However, the amendments do not overcome the rejection under Lof in view of Hayashi. Moreover, a new rejection is made under Lof in view of Garcia.

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 1-4, 6-12, and 14-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lof et al (2004/0160582) in view of Hayashi et al (2001/0035897).

Re claims 1, 14, and 15: Lof discloses an exposure apparatus [Fig 1] comprising:

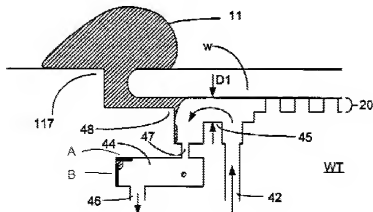
a projection optical system PL by which an image of a pattern MA is projected onto an upper surface of a substrate W; and

a stage apparatus [Fig 7a], the stage apparatus including:

a holder WT having a substrate holding surface 20 on which the substrate is held, there being a gap along an outer circumferential part of the substrate held on the holder [gap between W and 117];

a portion [passage from 117 to 46] that is disposed in a vicinity of the holder radially outward of the outer circumferential part of the substrate held by the holder, the portion [Drawing 1: portion A] being disposed lower than the upper surface of the substrate held by the holder and facing downward, the downward facing lyophilic portion A directly communicating with the gap [portion A has direct access to gap] and extending radially outward from the gap so that a liquid 11 in the gap flows from the gap radially outward to the downward facing lyophilic portion [liquid from gap flows radially outward from 47 to portion A]; and

a recovery device 46 that recovers the liquid leaked from the gap using the portion A.



Drawing 1 Fig 7a of Lof showing portions A and B.

Lof does not disclose expressly the portion being a lyophilic portion.

Hayashi teaches in Par 0145 an inner surface of a feed tube 302 being rendered hydrophilic.

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to make the entire passage from the gap to the port 46 of Lof, including portion A, lyophilic, as taught by Hayashi, for the purpose of attracting the liquid towards the port 46 and to reduce the staying of bubbles within the portion, thus permitting the liquid to be conducted efficiently [Par 0145].

Re claim 2: Lof discloses wherein the recovery device 46 has a suction device [Par 0126: vacuum source] that suctions the liquid guided to the lyophilic portion.

Re claim 3: Lof discloses all limitations of the claimed invention except for disclosing expressly wherein suction force of the suction device by which the liquid is recovered is greater than suction force by which the substrate is held on the holder.

However, the embodiment of Lof is drawn to preventing liquid from reaching the pimple table 20 by funneling the liquid to vacuum port 46. Both the pimple table 20 and the port 46 have their own vacuum sources.

As a result, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to make the suction force of the vacuum port 46 to be greater than the suction force of the pimple table 20, in order to attract liquid to the port 46 rather than to the pimple table 20, for the safe removal of the liquid and to prevent liquid from seeping into the pimple table, which would cause damage.

Re claim 4: Lof discloses wherein the suction device 46 includes a passage disposed below the lyophilic portion, and the lyophilic portion has an inclined portion B [inclined at 90°], which is inclined toward the passage of the suction device.

Re claim 6: Lof discloses wherein the recovery device 46 has a recessed portion that suctions the liquid by the capillary phenomenon [recessed portion of 46 suctions liquid by capillary action].

Re claim 7: Lof in view of Hayashi discloses wherein at least a part of the recessed portion [of 46] is lyophilic.

Re claims 8, 9, 12, and 16: Lof in view of Hayashi discloses all limitations of the claimed invention except for wherein the recovery device has a surface that is substantially parallel to the substrate holding surface, and at least a part of which is liquid repellent.

However, Embodiment 6 of Lof teaches in Fig 11:

Claim 8: wherein the recovery device has a surface 60 that is substantially parallel to the substrate holding surface 20, and at least a part of which is liquid repellent [Par 0157: hydrophobic layer 60 is liquid repellent].

Claims 9 and 16: wherein at least a part 60 of the holder WT is liquid repellent.

Claim 12: wherein a portion 60 of the holder WT that opposes the lyophilic portion is liquid repellent.

At the time the invention was made, it would have been obvious to have the flat portion 48 in Embodiment 3 of Lof rendered hydrophobic, as taught in Embodiment 6, for the purpose of more easily attracting the liquid to the vacuum port 46 for removal

from the system and so that the liquid does not find its way to the pimple table 20 [Par 0157], which would cause damage.

Re claim 10: Lof discloses all limitations of the claimed invention except for the substrate holding surface being liquid repellent.

However, Lof is directed to an immersion lithographic apparatus preventing liquid from reaching the pimple table 20. If liquid were to adhere to the pimple table surface, vacuum and wafer damage would result.

Therefore, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to make the substrate holding surface 20 of Lof liquid repellent, to remove liquid that reaches the substrate holding surface so the substrate holding surface functionality is maintained.

Re claim 11: Lof discloses wherein the lyophilic portion is disposed so that a space [Par 0128: gap between W and 48] is formed between the outer circumferential part of the substrate and the lyophilic portion.

Re claim 17: Lof discloses wherein the lyophilic portion has an inclined surface B which is downwardly inclined [downwardly inclined at 90°] in a direction away from the substrate W held on the holder.

Re claim 18: Lof discloses a flat surface 117 which is provided around the holder WT, and which is substantially flush with the surface of the substrate W held on the holder,

wherein the recovery device 46 recovers, using the lyophilic portion [passage between 117 and 46], the liquid 11 which has leaked from a gap between the flat surface 117 and the surface of the substrate W held on the holder.

Re claim 19: Lof discloses a liquid supply system [Fig 2] which has a supply port 13, the liquid supply system supplying the liquid 11 onto the substrate W to form a liquid immersion area [at 11] on a portion of a surface of the substrate during the exposure,

wherein the substrate is exposed through the liquid with exposure light PB.

Re claim 20: Lof discloses a device manufacturing method [Fig 1] comprising: exposing, through a liquid 11, a substrate W held on a holder WT of a stage apparatus [Fig 7a] of an exposure apparatus according to claim 1; and processing the exposed substrate [Par 0009: other procedures and various processes].

6. Claims 1-7, 11, 14, 15, and 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lof in view of Garcia (6,988,327).

Re claims 1, 14, and 15: Lof discloses an exposure apparatus [Fig 1] comprising:

a projection optical system PL by which an image of a pattern MA is projected onto an upper surface of a substrate W; and

a stage apparatus [Fig 7a], the stage apparatus including:

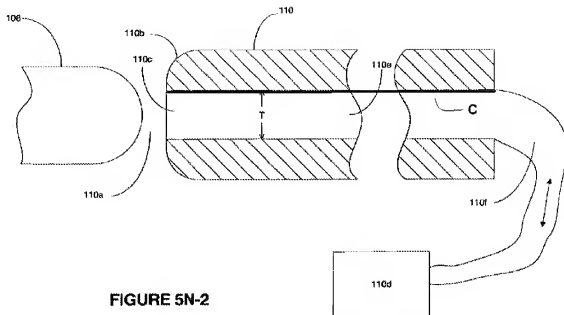
a holder WT having a substrate holding surface 20 on which the substrate is held, there being a gap along an outer circumferential part of the substrate held on the holder [gap between W and 117].

Lof does not disclose expressly a lyophilic portion and its specifics and a recovery device that recovers the liquid leaked from the gap using the lyophilic portion.

Garcia teaches

a lyophilic portion 110 [C18L42-44: hydrophilic material] that is disposed in a vicinity of the holder [C17L19-21: wafer holding device] radially outward of the outer circumferential part of the substrate 108 held by the holder [Fig 5], the lyophilic portion [Drawing 2: portion C] being disposed lower than the upper surface of the substrate held by the holder and facing downward, the downward facing lyophilic portion directly communicating with the gap 110a and extending radially outward from the gap so that a liquid in the gap flows from the gap radially outward to the downward facing lyophilic portion; and

a recovery device 110c that recovers the liquid leaked from the gap using the lyophilic portion 110 [C20L44-46].



Drawing 2 Fig 5N-2 of Garcia showing portion C.

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to replace the edge seal member 117 of Lof with the edge platform 110 of Garcia in the immersion lithographic apparatus of Lof, for the purpose of more effectively attracting the liquid, due to the hydrophilic material, to improve liquid recovery.

Re claims 2, 4, 6, 7, 11, 17, and 18: Lof in view of Garcia discloses all limitations of the claimed invention except for the details of the lyophilic portion.

Garcia teaches:

Claim 2: wherein the recovery device 110c has a suction device 110d that suctions the liquid guided to the lyophilic portion 110 [C20L45: using vacuum].

Claim 4: wherein the suction device includes a passage 110e disposed below the lyophilic portion 110, and the lyophilic portion has an inclined portion 110f, which is inclined toward the passage of the suction device 110d.

Claim 6: wherein the recovery device has a recessed portion 110c that suctions the liquid by the capillary phenomenon [recessed portion of 110c suctions liquid by capillary action].

Claim 7: wherein at least a part of the recessed portion 110c is lyophilic [C18L44-45: edge platform 110, which is outer part of the multiple inlets 110c, is hydrophilic].

Claim 11: wherein the lyophilic portion 110 is disposed so that a space 110a is formed between the outer circumferential part of the substrate 108 and the lyophilic portion 110 [Fig 5j].

Claim 17: wherein the lyophilic portion 110 has an inclined surface 110f which is downwardly inclined in a direction away from the substrate 108 held on the holder.

Claim 18: a flat surface 110 which is provided around the holder, and which is substantially flush with the surface of the substrate 108 held on the holder [C17L7-8:co-planer],

wherein the recovery device 110c recovers, using the lyophilic portion 110, the liquid which has leaked from a gap 110a between the flat surface and the surface of the substrate held on the holder.

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to use the details of the lyophilic portion 110 of Garcia in the

immersion apparatus of Fukami, for the purpose of effectively transporting liquid away from the side of the wafer.

Re claim 3: Lof in view of Garcia discloses all limitations of the claimed invention except for disclosing expressly wherein suction force of the suction device 110d by which the liquid is recovered is greater than suction force by which the substrate is held on the holder WT.

However, the embodiment of Lof is drawn to preventing liquid from reaching the pimple table 20 by funneling the liquid to a vacuum port 46.

As a result, at the time the invention was made, it would have been obvious to one of ordinary skill in the art to make the suction force of the source 110d to be greater than the suction force of the pimple table 20, in order to attract liquid to the source 110d rather than to the pimple table 20, for the safe removal of the liquid and to prevent liquid from seeping into the pimple table, which would cause damage.

Re claim 5: Lof in view of Garcia discloses wherein the downward facing lyophilic portion C has a first portion that is higher than the substrate holding surface 20.

Re claim 19: Lof discloses a liquid supply system [Fig 2] which has a supply port 13, the liquid supply system supplying the liquid 11 onto the substrate W to form a liquid immersion area [at 11] on a portion of a surface of the substrate during the exposure,

wherein the substrate is exposed through the liquid with exposure light PB.

Re claim 20: Lof discloses a device manufacturing method [Fig 1] comprising:

exposing, through a liquid 11, a substrate W held on a holder WT of a stage apparatus [Fig 7a] of an exposure apparatus according to claim 1; and
processing the exposed substrate [Par 0009: other procedures and various processes].

Response to Arguments

7. Applicant's arguments with respect to the rejection under Lof have been fully considered but they are not persuasive. Applicant argues, "However, surface A of Lof et al does not directly communicate with the gap surrounding the Lof et al substrate, and does not extend radially outward from the gap" [P7L4-6]. The examiner respectfully disagrees. In Drawing 1, the surface A has direct access to the gap that is located between W and 117. Moreover, the liquid 11 flows directly from the gap to the surface. Additionally, it is unclear what the phrase "directly communicating" is meant convey in terms of the structural relationship. For this reason, the claim limitation "the downward facing lyophilic portion directly communicating with the gap" of claims 1 is taught by the surface A of Lof. Second, the surface A does extend radially outward from the gap. The gap extends under the substrate W between W and 117 in Fig 7a. At this point, the surface A is further radially outward. Moreover, the liquid in the gap flows from the gap radially outward to the downward facing lyophilic portion from 47. As a result, Lof teaches the claim limitation "the downward facing lyophilic portion...extending radially outward from the gap so that a liquid in the gap flows from the gap radially outward to the downward facing lyophilic portion." Therefore, Applicant's arguments on these points are not persuasive.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Liu whose telephone number is 571-272-9019. The examiner can normally be reached on Monday through Friday 9 am - 5 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diane Lee can be reached on 571-272-2399. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

/Michael Liu/
8/28/09

Michael Liu
Examiner
Art Unit 2851

/Peter B. Kim/
Primary Examiner, Art Unit 2851